PIO-48.PC104 User Manual

Part Number 3701

SEALEVEL SYSTEMS INCORPORATED

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Introduction

PIO-48.PC104

The PIO-48.PC104 part number 3701 digital I/O interface provides 48 channels of buffered drive digital I/O emulating 8255 mode zero. The PIO-48.PC104 can be utilized for a variety of control and automation applications including control and monitoring of TTL devices (e.g. LEDs, small solenoids, small relays) and interfacing to solid-state relay racks (SSRs) for high-power AC or DC loads.

The PIO-48.PC104's 48 digital I/O channels are accessed via two 50-pin header connectors with industry-standard pin out. Each header provides 24 bits of digital I/O divided into two eight-bit ports and two four bit ports for upper and lower nibble. Each port may be individually configured via software command as input or output to best match your particular application requirements.

The PIO-48.PC104 is designed to be used with a variety of Operating Systems including Windows 98/NT/ME/2000/XP, Linux and DOS. The SeaI/O API (Application Programmer Interface) included on CD with the PIO-48.PC104 provides a variety of useful high-level function calls implemented as a Windows dynamic link library (DLL) and as a Linux kernel module and library. In addition to the API, SeaI/O includes sample code and utilities to simplify software development.

Other Sealevel PC104 Digital I/O Products

DIO-104.REL	(P/N 3710)	- 16 Reed Relays
DIO-104.OPTO	(P/N 3720)	- 16 Optically Isolated Inputs
DIO-32.104	(P/N 3730)	- 16 Optically Isolated Inputs/16 Reed Relays

Before You Get Started

What's Included

The PIO-48.PC104 is shipped with the following items. If any of these items is missing or damaged please contact Sealevel for replacement.

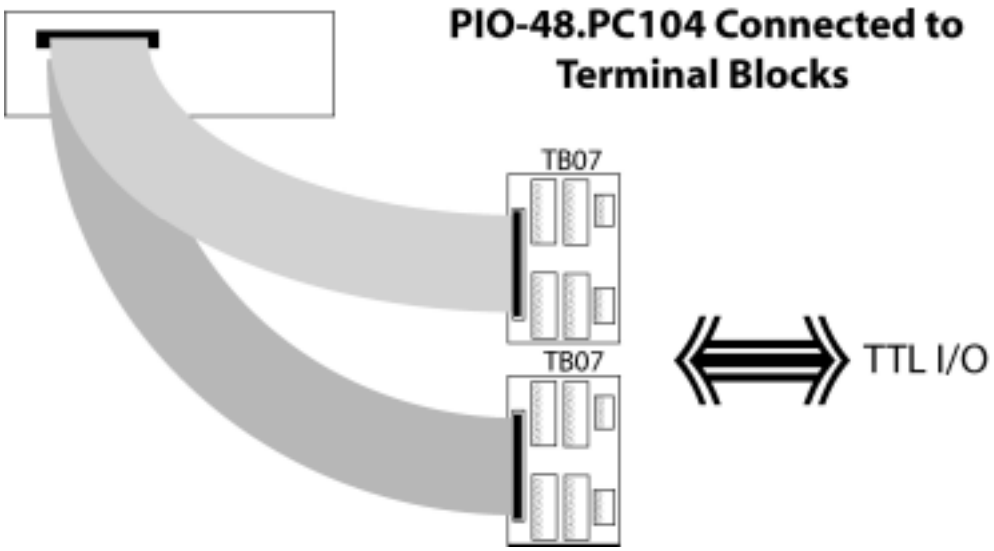
- **PIO-48.PC104 Adapter**
- **Sealevel SeaI/O Software CD**

Optional Items

Depending upon your application, you are likely to find one or more of the following items useful for interfacing the PIO-48.PC104 to real-world signals. All items can be purchased from our website (http:\\www.sealevel.com) or by calling 864-843-4343.

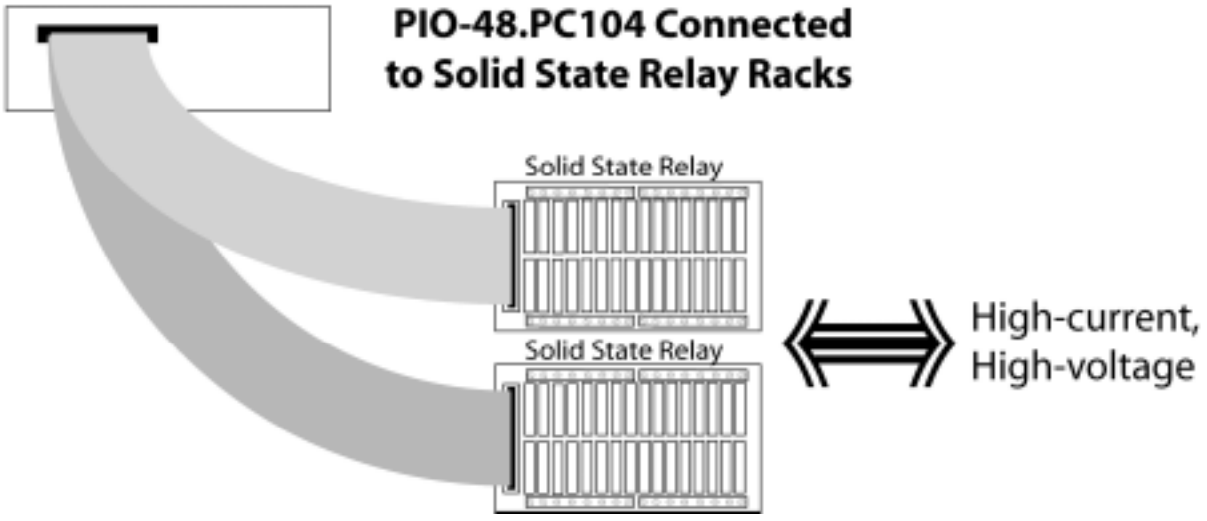
For TTL applications:

- **Terminal Block Kit - (Part Number KT107)**
  - Kit includes the TB07 screw terminal block and CA167 ribbon cable for connecting one of the PIO-48.PC104's 50-pin header connectors to your I/O. 6" Snap track and DIN rail clips are included for DIN rail mounting.
- **IDC 50 to IDC 50 Pin 40" Ribbon Cable (Part Number CA167)**
  - Interfaces each of the PIO-48.PC104's 50-pin header connectors.
- **Simulation/debug module (Part Number TA01)**
  - Module allows monitoring status of output pins and controlling state of input pins. An LED corresponding to each port bit illuminates to indicate state. Eight position DIP-switches are used to generate input status changes.



For high-current, high-voltage applications:

- **IDC 50 to IDC 50 Pin Ribbon Cable (Part Number CA167)**
  - 40” cable connects the PIO-96.PCI to solid-state relay racks equipped with 50-pin header interface.
- **IDC 50 to IDC 50 Pin Ribbon Cable (Part Number CA135)**
  - 40” cable connects the PIO-96.PCI to solid-state relay racks equipped with 50-pin edge connector.
- **Solid-State Relay Racks:**
  - **Quad six position relay rack (Part Number PB24HQ)**
    - Relay rack can accept up to six QSSRs for a total of 24 channels. Features a 50-pin header connector for easy interface via 50-conductor ribbon cables.
  - **Quad four position relay rack (Part Number PB16HQ)**
    - Relay rack can accept up to four QSSRs for a total of 16 channels. Features a 50-pin header connector for easy interface via 50-conductor ribbon cables.
- **Quad Solid-State Relay Modules:**
  - **AC Input (Part Number IA5Q)** - Provides 4 channels of discrete I/O interface to monitor AC inputs up to 140V @ 10mA.
  - **DC Input (Part Number IB5Q)** - Provides 4 channels of discrete I/O interface to monitor DC inputs from 3.3V to 32V.
  - **AC Output (Part Number OA5Q)** - Provides 4 channels of discrete I/O interface to control AC outputs up to 140V @ 3A.
  - **DC Output (Part Number OB5Q)** - Provides 4 channels of discrete I/O interface to control DC outputs up to 60V @ 3A.
- **Simulation/debug module (Part Number TA01)**
  - Module simulates the operation and load characteristics of a standard 24-channel relay rack. An LED corresponding to each port bit illuminates to indicate state. Eight position DIP-switches are used to generate input status changes.

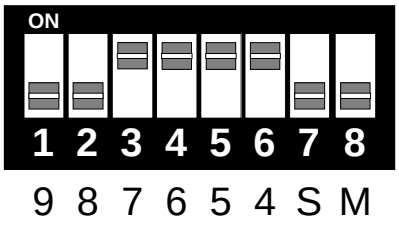


Card Setup

Address Selection

The PIO-48.PC104 occupies 8 consecutive I/O locations. The DIP-switch (S1) is used to set the base address for these locations and the IRQ mode options. Be careful when selecting the base address as some selections conflict with existing PC ports. The following table shows several examples that usually do not cause a conflict.

		A9	A8	A7	A6	A5	A4
Hex Address	Binary	1	2	3	4	5	6
100-107	01 0000 xxxx	On	Off	On	On	On	On
180-187	01 1000 xxxx	On	Off	Off	On	On	On
200-207	10 0000 xxxx	Off	On	On	On	On	On
280-287	10 1000 xxxx	Off	On	Off	On	On	On
300-307	11 0000 xxxx	Off	Off	On	On	On	On
380-387	11 1000 xxxx	Off	Off	Off	On	On	On
3A0-3A7	11 1010 xxxx	Off	Off	Off	On	Off	On



Interrupt Modes

DIP-Switch positions ‘S’ and ‘M’ on switch S1 selects the interrupt mode for each adapter.

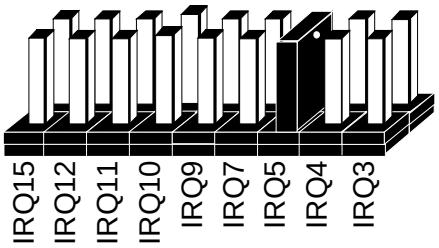
With the ‘**S**’ selected, the adapter is in a (**S**)hared interrupt mode, which allows more than one adapter to access a single IRQ.

‘**M**’ indicates the inclusion of a 1K-ohm pull-down resistor required on one adapter when sharing interrupts.

Set the switch to ‘**S**’ for shared interrupt mode on all adapters sharing an IRQ. On one of the adapters sharing an interrupt set the switches for both ‘**S**’ and for ‘**M**’. This provides the pull-down resistor circuit that makes sharing IRQs possible. If you are using more than one compatible adapter in a bus you should only have one adapter set to ‘**M**’.

IRQ Selection

The PIO-48.PC104 has an interrupt selection jumper, which should be set prior to use, if an interrupt is required by your application software. Consult the user manual for the application software being used to determine the proper setting.



Note: The supplied driver for both Windows and Linux does not require, nor does it support interrupts. It is recommended that this jumper be removed to prevent any resource conflicts.

Software Installation

Windows 98/ME/2000/XP Installation

1. Start Windows.
2. Insert the Sealevel Systems CD in to your CD drive.
3. If 'Auto-Start' is enabled for this drive the software will automatically launch. Otherwise, point your browser to the 'Index.htm' on the root directory of the CD
4. Select 'Install Software'.
5. Select the Part Number for your adapter from the listing.
6. Select 'Windows 98/NT/ME/2000/XP'. The setup file will automatically detect the operating environment and install the proper components. Next (depending on your browser) select the 'Run this program from its current location' or 'Open' option. Follow the information presented on the screens that follow. During setup the user may specify installation directories and other preferred configurations. This program also adds entries to the system registry that are necessary for specifying the operating parameters for each driver. An uninstall option is also available to remove SeaIO files and registry/INI file entries from the system.
7. If installing in NT, skip to 'Windows NT Card Installation' step 16.
8. Go to the "Add New Hardware Wizard" in the Control Panel.
9. When the Wizard asks if you want Windows to search for the new hardware, choose "No, I want to select the hardware from a list."
10. Scroll through the list of categorized hardware and select 'SeaIO Devices'. If this is the first SeaIO device you may need to select 'Other Devices' and 'Sealevel Systems, Inc.' instead of 'SeaIO Devices'.
11. Click "Next".
12. Select the card model and press "Next".
13. The Wizard will guide you through a few more informational prompts; continue to click "Next" until it is completed.
14. Your card's resource assignments may be adjusted through the Device Manager (if, for instance, you need to change the I/O port address Windows assigned when you installed the card).
15. Windows software installation is complete
16. Windows NT Card Installation: After accomplishing steps 1 – 6, bring up the Control Panel and double-click on the SeaIO Devices icon. To install a new card, click "Add Port". Repeat this procedure for as many SeaIO cards as you wish to install.

Linux Installation

Note: You MUST have "root" privileges to install the software and drivers.

1. Login as "root".
2. Mount the CDROM by typing:

   mount -t iso9660 /dev/hdc /cdrom

   Note: Your cdrom may not be /dev/hdc it could be /dev/hda, /dev/hdb, /dev/hdd, or if you have a SCSI drive /dev/sda, /dev/sdb, /dev/sdc, etc. You may mount the CDROM to any location, the /cdrom is just a common example.
3. Next change to the directory where you mounted the CDROM:

   Ex. cd /cdrom/software/SeaIO/Other/linux

   Note: The syntax is case sensitive.
4. Copy seaio .tar.gz to your home directory by typing:

   cp seaio .tar.gz ~
5. Change to your home directory by typing:

   cd
6. Unmount the drive and then Unzip and Untar the drivers and software by typing:

   umount /cdrom

   tar -xvzf seaio .tar.gz
7. Change to the SeaIO directory by typing:

   cd SeaIO
8. Now compile and prepare the drivers for use:

   make install
9. Using your favorite text editor, edit the /etc/seaio.conf
10. Within the quote marks, insert

    cardtype=0xYourSeaIOcardType io=0xCardBaseAddress

    Note: YourSeaIOcardType = Model Number of your SeaIO Card. CardBaseAddress = What base address you have your SeaIO card addressed at.
11. Save the file and exit your editor.
12. Load the driver by typing:

    SeaIO -load

    The driver has enabled the card and is ready to use, and you now have the option to run a test utility on it. Skip to section "Using the test software" if you wish to do so at this time.

    To set up Linux to automatically load the driver; refer to a Linux manual concerning your specific distribution for help.

Physical Installation

Extreme care should be taken when installing the PIO-48.PC104 to avoid causing damage to the connectors. After the adapter is installed, connect your I/O cables to P2 and P5. Please note these headers are keyed so that pin 1 of the cable matches pin 1 of the connector. Refer to Card Setup for information on setting the address and jumper options before inserting the PIO-48.PC104 onto the stack.

Do not install the Adapter in the machine until the software has been fully installed.

1. **Turn off power. Disconnect the power cord.**
2. Gently insert the PIO-48.PC104 connector noting proper key orientation of the expansion connector on a PC/104 compatible card. The PIO-48.PC104 adapter is keyed per the current PC/104 Specification. This will aid in preventing the adapter from being inserted incorrectly.
3. Mounting hardware (nylon stand-offs and screws) is provided to ensure a good mechanical connection. Retain any mounting hardware not used to allow for future expansion.
4. The cables provided are keyed and can be installed before or after the adapter is inserted in the stack.
5. Connect the power cord and power up the machine.

The PIO-48.PC104 is now ready for use.

3rd Party Software Support

Third party software support for many HMI/MMI and other process control software is included on the product installation CD. For the most up to date information on third party software support, please visit:
http://www.sealevel.com/thirdpartysoftware.asp

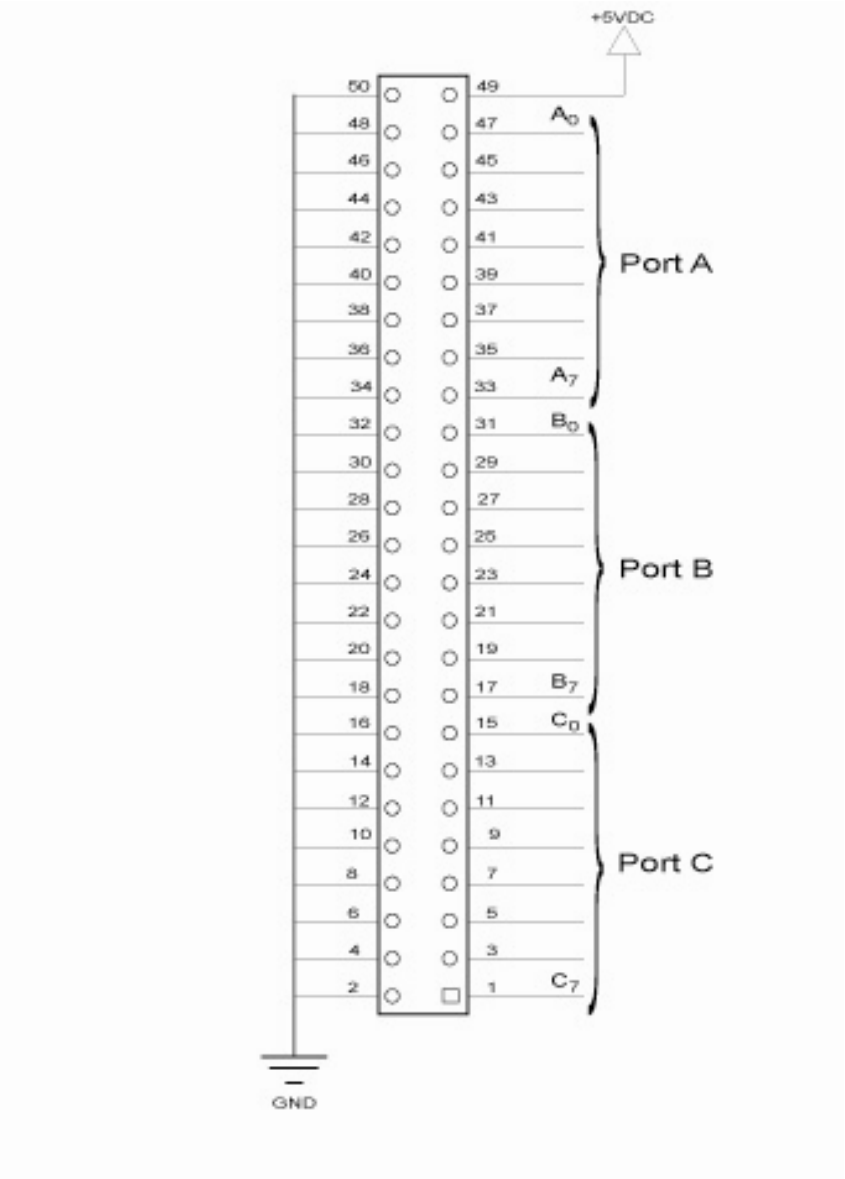
Digital I/O Interface

The PIO-48.PC104's 48 digital I/O channels are accessed via four industry-standard 50-pin header connectors. Each header provides 24 bits of digital I/O divided into two eight-bit ports and two four bit ports for upper and lower nibble. Each port may be individually configured via software command as input or output.

50-pin Header Connectors

You will need to install the cables to the PIO-48.PC104 prior to installing it in the PC.

Each of the 50-pin connectors has the following pin out which is compatible with a wide variety of solid state relay racks:



Pull Ups

Eight resistors are installed to provide pull-ups to the input ports. These are installed on all ports. The pull-up resistors are rated at 10K ohms. Figure 4 below provides the resistors and corresponding port. The resistors ensure that no line is floating which is not connected. This provides consistent biasing on all un-terminated lines.

Resistor	Corresponding Port
R34-R41	Port A1
R42-R49	Port B1
R50-R53	Port C1L
R54-R57	Port C1U
R1-R8	Port A2
R9-R16	Port B2
R17-R20	Port C2L
R21-R24	Port C2U

Physical Connection

The port signals for the PIO-48.PC104 are physically connected via two 50-pin box headers. P5 provides the connections for ports A1-C1 and P2 provide the connections for A2-C2. These headers are compatible with the industry standard 50-pin ribbon/IDC type cabling. This allows for a direct cabling connection between the PIO-48.PC104 and a Solid State Relay Rack (i.e. PB-8. PB-16, PB-24 etc.)

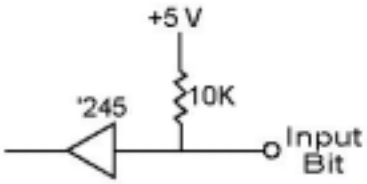
The following table shows the correlation between the port addresses and the 50-pin connections.

Description	Pin #
Port A	
A0	47
A1	45
A2	43
A3	41
A4	39
A5	37
A6	35
A7	33
Port B	
B0	31
B1	29
B2	27
B3	25
B4	23
B5	21
B6	19
B7	17
Port C	
C0L	15
C1L	13
C2L	11
C3L	9
C4U	7
C5U	5
C6U	3
C7U	1
GND	All Even pins
+5V	49

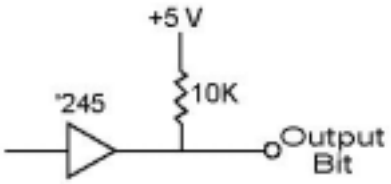
Electrical Characteristics

The PIO-48.PC104 uses 74LS245 octal bi-directional transceivers to provide TTL input/output capabilities. Each bit is pulled to +5V through a 10K ohm pull-up resistor to insure each bit is at a known state when not driven.

Input Circuit Schematic



Output Circuit Schematic



Specifications

Inputs

- Logic High: Min 2VDC
- Logic Low: Max 0.8VDC

Outputs

- Logic High: Min 2VDC @ 15 mA
- Logic Low: Max 0.55VDC @ 24 mA

Recommended Operating Conditions

- Inputs: Min 0V
- Inputs: Max 5.25V
- Source: 15mA
- Sink: 24mA

Temperature Range

- Operating: 0°C – 70°C
- Storage: -50°C – 105°C

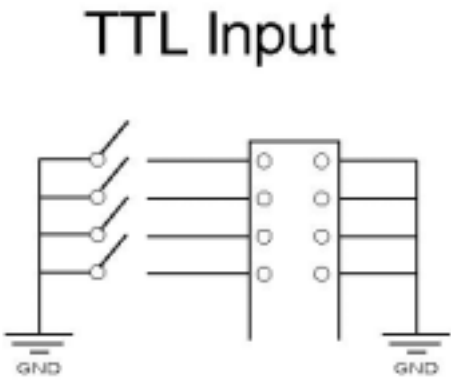
Power Requirements

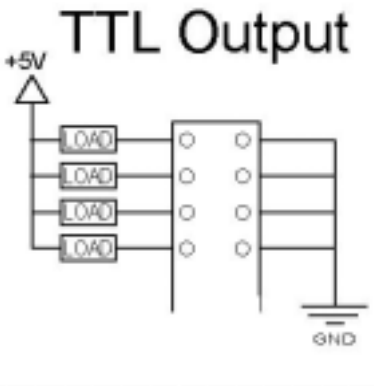
- +5VDC @ 794mA

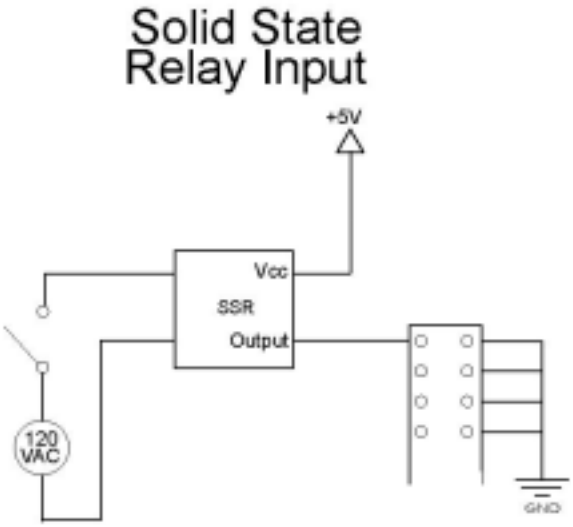
Physical Dimensions

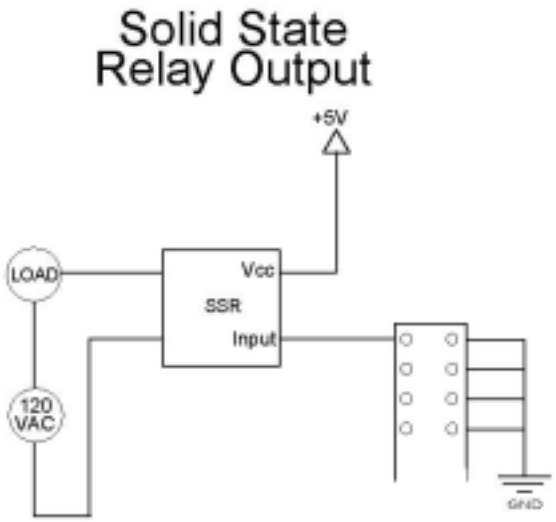
- Length: 3.550 inches (9.017cm)
- Height: 3.775 inches (9.589cm)

Example Circuits









Programming the PIO-48.PC104

Sealevel's SeaI/O software is provided to assist in the development of reliable applications for the Sealevel Systems family of digital I/O adapters. Included on the SeaI/O CD are driver functions for use in accessing the I/O as well as helpful samples and utilities.

Programming for Windows

The SeaI/O API (Application Programmer Interface) provides a variety of useful high-level function calls implemented in a Windows dynamic link library (DLL). The API is defined in the help file (Start/Programs/SeaIO/SeaIO Help) under "Application Programmers Interface". This help file also includes detailed information dealing with installation / removal of the software and information about latency, logic states, and device configuration.

For C language programmers we recommend using the API to access the PIO-48.PC104. If you are programming in Visual Basic, using the ActiveX control included with SeaI/O is advised.

Samples and Utilities

A variety of sample programs and utilities (both executable and source code) are included with SeaI/O. Further documentation on these samples can be found by selecting "Start/Programs/SeaIO/Sample Application Description". Information about where the files are physically stored on your disk is also included in this same file.

Programming for Linux

SeaI/O for Linux consists of two major parts: a kernel module and a library. The kernel module is a simple IO pass-through device, allowing the library to handle the more sophisticated functions provided to SeaI/O users. It is provided in a 'tarball' format and can easily be compiled and included in the kernel build.

Direct Hardware Control

In systems where the users program has direct access to the hardware (DOS) the tables that follow give the mapping and functions that the PIO-48.PC104 provides.

Reading the Inputs

The inputs are active high. If an input is driven high (2V to 5.25 V) it will read as a logical one, if driven low (0V to 0.8V) it will read as a logical zero. If an input is not driven it will read as a one due to the 10K ohm pull up resistors on each port.

Reading the Outputs

The value that is currently being used to drive the outputs will be returned.

Presetting an Output Port

Each port has an output register associated with it. This register may be written and retains its value whether the port is configured as an input or an output. To preset the value of an output port the program should write to the port when it is configured as an input then configure it as an output.

Writing the Outputs

The outputs are active high. Writing a one (1) corresponds to 5V while writing a zero (0) corresponds to 0V, at the output.

Port C

Port C is written and read to as two four bit ports. If both lower and upper nibbles are configure the same then no special considerations need to be made. But if they are configured differently, one nibble as input, and one as output then the user will have to keep this in mind. When reading, the input will be returned on the corresponding upper or lower nibble while the current outputs will be returned on their corresponding upper or lower nibble. When writing, the corresponding nibble will be written to the output nibble, while the input nibble will have its output register written to. The output register can be written to without affecting the inputs.

Register Description

Address		Mode	D7	D6	D5	D4	D3	D2	D1	D0
Base+0	Port A1	RD/WR	PA1D7	PA1D6	PA1D5	PA1D4	PA1D3	PA1D2	PA1D1	PA1D0
Base+1	Port B1	RD/WR	PB1D7	PB1D6	PB1D5	PB1D4	PB1D3	PB1D2	PB1D1	PB1D0
Base+2	Port C1	RD/WR	PC1D7	PC1D6	PC1D5	PC1D4	PC1D3	PC1D2	PC1D1	PC1D0
Base+3	Control Word Port 1	WR	0	0	0	CW1D4	CW1D3	0	CW1D1	CW1D0
Base+4	Interrupt config Port 1	RD/WR	0	0	0	0	0	IRQEN1	IRQC11	IRQC10
Base+5	Interrupt status Port 1 and 2	RD	0	0	0	IRQST2	0	0	0	IRQST1
Base+8	Port A2	RD/WR	PA2D7	PA2D6	PA2D5	PA2D4	PA2D3	PA2D2	PA2D1	PA2D0
Base+9	Port B2	RD/WR	PB2D7	PB2D6	PB2D5	PB2D4	PB2D3	PB2D2	PB2D1	PB2D0
Base+A (10)	Port C2	RD/WR	PC2D7	PC2D6	PC2D5	PC2D4	PC2D3	PC2D2	PC2D1	PC2D0
Base+B (11)	Control Word Port 2	WR	0	0	0	CW2D4	CW2D3	0	CW2D1	CW2D0
Base+C (12)	Interrupt config Port 2	RD/WR	0	0	0	0	0	IRQEN2	IRQC21	IRQC20

I/O Control Word

Each port may be configured as either Input or Output. This is accomplished by writing the correct Control Word (CW) to the proper register.

CWnD0	Port C1 lower nibble (bits 0-3)	1 = input	0 = output	1 on power up
CWnD1	Port B1	1 = input	0 = output	1 on power up
CWnD2	0 or 1 (no effect)			
CWnD3	Port C1 upper nibble (bits 4-7)	1 = input	0 = output	1 on power up
CWnD4	Port A1	1 = input	0 = output	1 on power up
CWnD5	0 or 1 (no effect)			
CWnD6	0 or 1 (no effect)			
CWnD7	0 or 1 (no effect)			

Control Word (X = 0)								Hex Value	Port Setup			
7	**6**	**5**	**4**	**3**	**2**	**1**	**0**		A	B	C Upper	C Lower
X	X	X	0	0	X	0	0	80	Out	Out	Out	Out
X	X	X	0	0	X	0	1	81	Out	Out	Out	In
X	X	X	0	0	X	1	0	82	Out	In	Out	Out
X	X	X	0	0	X	1	1	83	Out	In	Out	In
X	X	X	0	1	X	0	0	88	Out	Out	In	Out
X	X	X	0	1	X	0	1	89	Out	Out	In	In
X	X	X	0	1	X	1	0	8A	Out	In	In	Out
X	X	X	0	1	X	1	1	8B	Out	In	In	In
X	X	X	1	0	X	0	0	90	In	Out	Out	Out
X	X	X	1	0	X	0	1	91	In	Out	Out	In
X	X	X	1	0	X	1	0	92	In	In	Out	Out
X	X	X	1	0	X	1	1	93	In	In	Out	In
X	X	X	1	1	X	0	0	98	In	Out	In	Out
X	X	X	1	1	X	0	1	99	In	Out	In	In
X	X	X	1	1	X	1	0	9A	In	In	In	Out
X	X	X	1	1	X	1	1	9B	In	In	In	In

Interrupt Control

When enabled interrupts are generated on port bit A0 of each port (pin 47 on each 50 pin header), the port A0 must be set as an input.

X = port number

IRQENX	interrupt enable	1 = enabled	0 = disabled (0 on power up)
IRQCX0	Interrupt mode select see table		
IRQCX1	Interrupt mode select see table		

Interrupt mode select table

IRQCn1	IRQCn0	INT Type
0	0	Low level
0	1	High level
1	0	Falling edge
1	1	Rising edge

Interrupt Read

Reading the INTSTAT port (Base+5) clears any interrupt pending.

IRQST1	(D0) Interrupt status	1 = interrupt pending, 0 = none
IRQST2	(D4) Interrupt status	1 = interrupt pending, 0 = none

Appendix A - Troubleshooting

Following these simple steps can eliminate most common problems.

Install software first. After installing the software then proceed to adding the hardware. This places the required installation files in the correct locations.

Read this manual thoroughly before attempting to install the adapter in your system.

Use Device Manager under Windows to verify proper installation.

Use the SeaIO Control Panel applet or the Device Manager's property page for card identification and configuration.

If these steps do not solve your problem, please call Sealevel Systems' Technical Support, (864) 843-4343. Our technical support is free and available from 8:00AM-5PM Eastern Time Monday through Friday. For email support contact mailto:support@sealevel.com.

Appendix B - How To Get Assistance

Begin by reading through the Trouble Shooting Guide in Appendix A. If assistance is still needed please see below.

When calling for technical assistance, please have your user manual and current adapter settings. If possible, please have the adapter installed in a computer ready to run diagnostics.

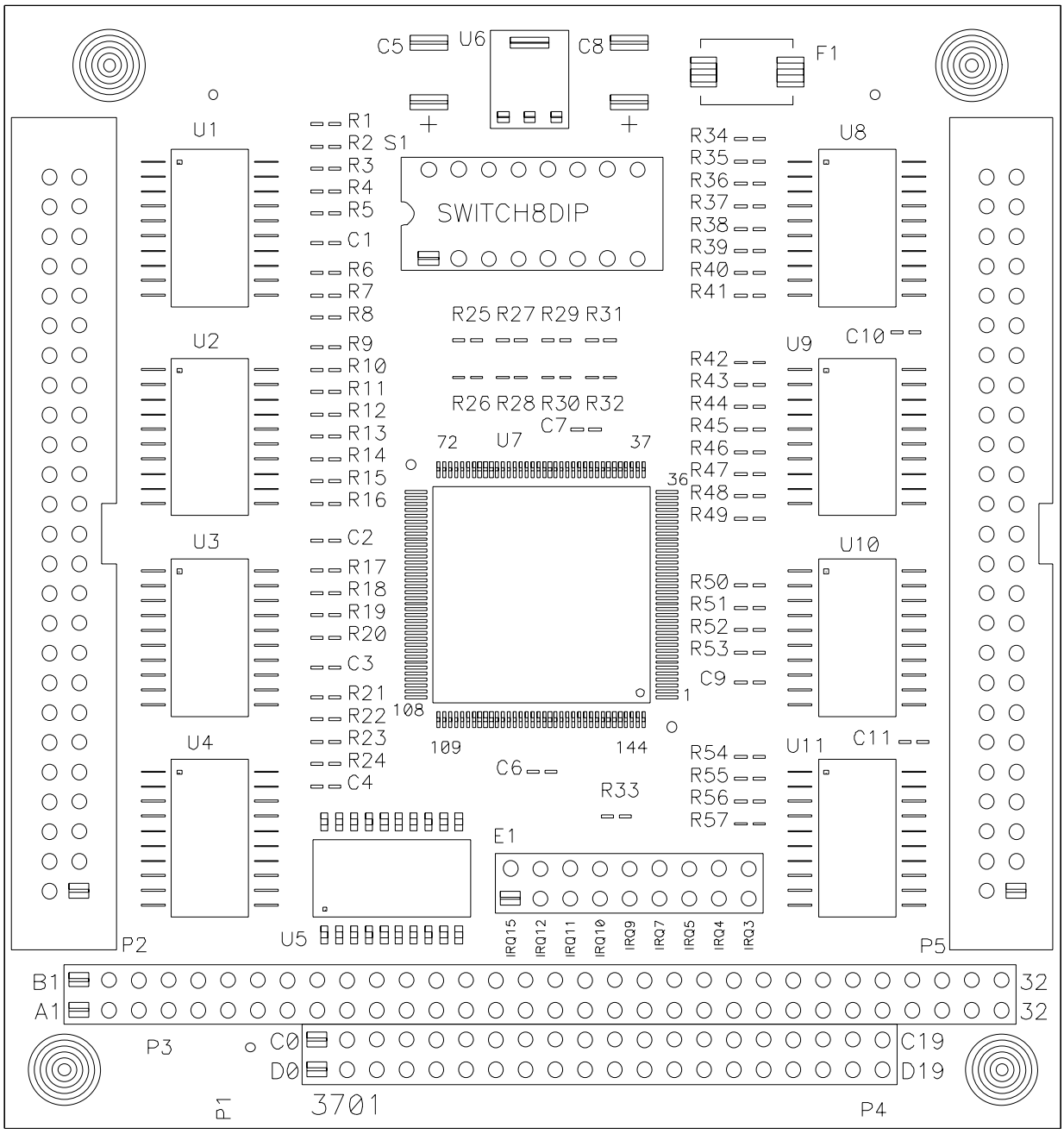
Sealevel Systems provides an FAQ section on its web site. Please refer to this to answer many common questions. This section can be found at http://www.sealevel.com/faq.asp

Sealevel Systems maintains a Home page on the Internet. Our home page address is http://www.sealevel.com. The latest software updates, and newest manuals are available via our FTP site that can be accessed from our home page.

Technical support is available Monday to Friday from 8:00 a.m. to 5:00 p.m. eastern time. Technical support can be reached at (864) 843-4343.

RETURN AUTHORIZATION MUST BE OBTAINED FROM SEALEVEL SYSTEMS BEFORE RETURNED MERCHANDISE WILL BE ACCEPTED. AUTHORIZATION CAN BE OBTAINED BY CALLING SEALEVEL SYSTEMS AND REQUESTING A RETURN MERCHANDISE AUTHORIZATION (RMA) NUMBER.

Appendix C – Silk Screen – 3701 PCB



Appendix D - Compliance Notices

Federal Communications Commission Statement

FCC - This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in such case the user will be required to correct the interference at the users expense.

EMC Directive Statement

Products bearing the CE Label fulfill the requirements of the EMC directive (89/336/EEC) and of the low-voltage directive (73/23/EEC) issued by the European Commission.

To obey these directives, the following European standards must be met:

EN55022 Class A - "Limits and methods of measurement of radio interference characteristics of information technology equipment"

EN55024 – "Information technology equipment Immunity characteristics Limits and methods of measurement".

EN60950 (IEC950) - "Safety of information technology equipment, including electrical business equipment"

Warning

This is a Class A Product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures to prevent or correct the interference.

Always use cabling provided with this product if possible. If no cable is provided or if an alternate cable is required, use high quality shielded cabling to maintain compliance with FCC/EMC directives.

Warranty

Sealevel's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel manufactured products. We are able to offer this warranty due to our control of manufacturing quality and the historically high reliability of our products in the field. Sealevel products are designed and manufactured at its Liberty, South Carolina facility, allowing direct control over product development, production, burn-in and testing.

Sealevel Systems, Inc. (hereafter "Sealevel") warrants that the Product shall conform to and perform in accordance with published technical specifications and shall be free of defects in materials and workmanship for life. In the event of failure, Sealevel will repair or replace the product at Sealevel's sole discretion. Failures resulting from misapplication or misuse of the Product, failure to adhere to any specifications or instructions, or failure resulting from neglect or abuse are not covered under this warranty.

Warranty service is obtained by delivering the Product to Sealevel and providing proof of purchase. **Return authorization must be obtained from Sealevel Systems before returned merchandise will be accepted. Authorization is obtained by calling Sealevel Systems and requesting a Return Merchandise Authorization (RMA) number.** The Customer agrees to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to Sealevel, and to use the original shipping container or equivalent. Warranty is valid only for original purchaser and is not transferable.

Sealevel Systems assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Sealevel Systems will not be liable for any claim made by any other related party.

This warranty applies to Sealevel manufactured Product. Product purchased through Sealevel but manufactured by a third party will retain the original manufacturer's warranty.

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Trademarks

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